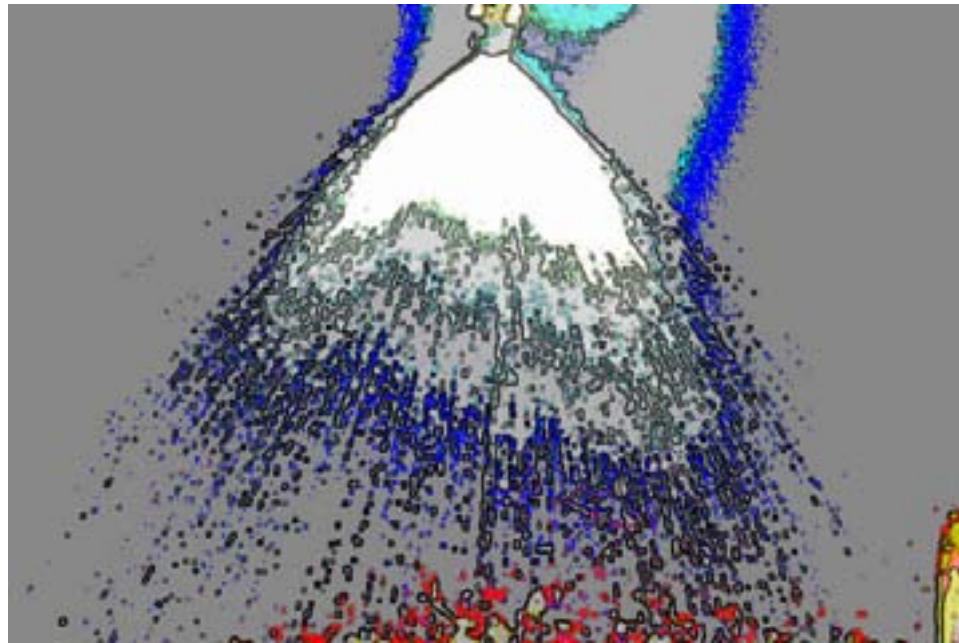


Sprayer Calibration



John Boyd
University of Arkansas

To mix and spray accurately you must know three things.....

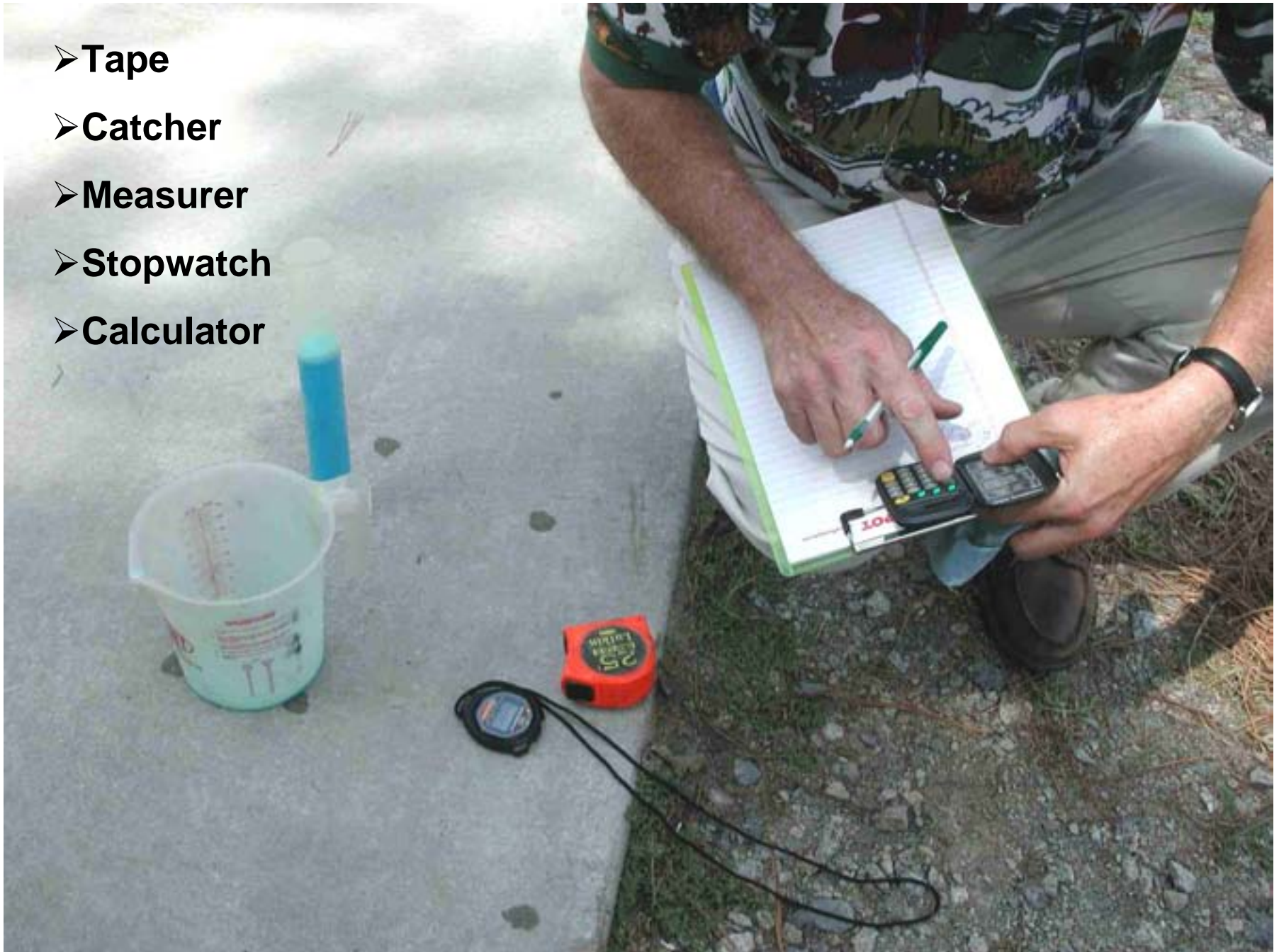
- 1. Sprayer output in gallons per acre**
- 2. Desired herbicide rate per acre**
- 3. Tank capacity**

boom sprayers

Equipment Needed

- Stopwatch
- Measuring tape (100 ft)
- Measuring cup or graduated cylinder
- Calculator

- **Tape**
- **Catcher**
- **Measurer**
- **Stopwatch**
- **Calculator**

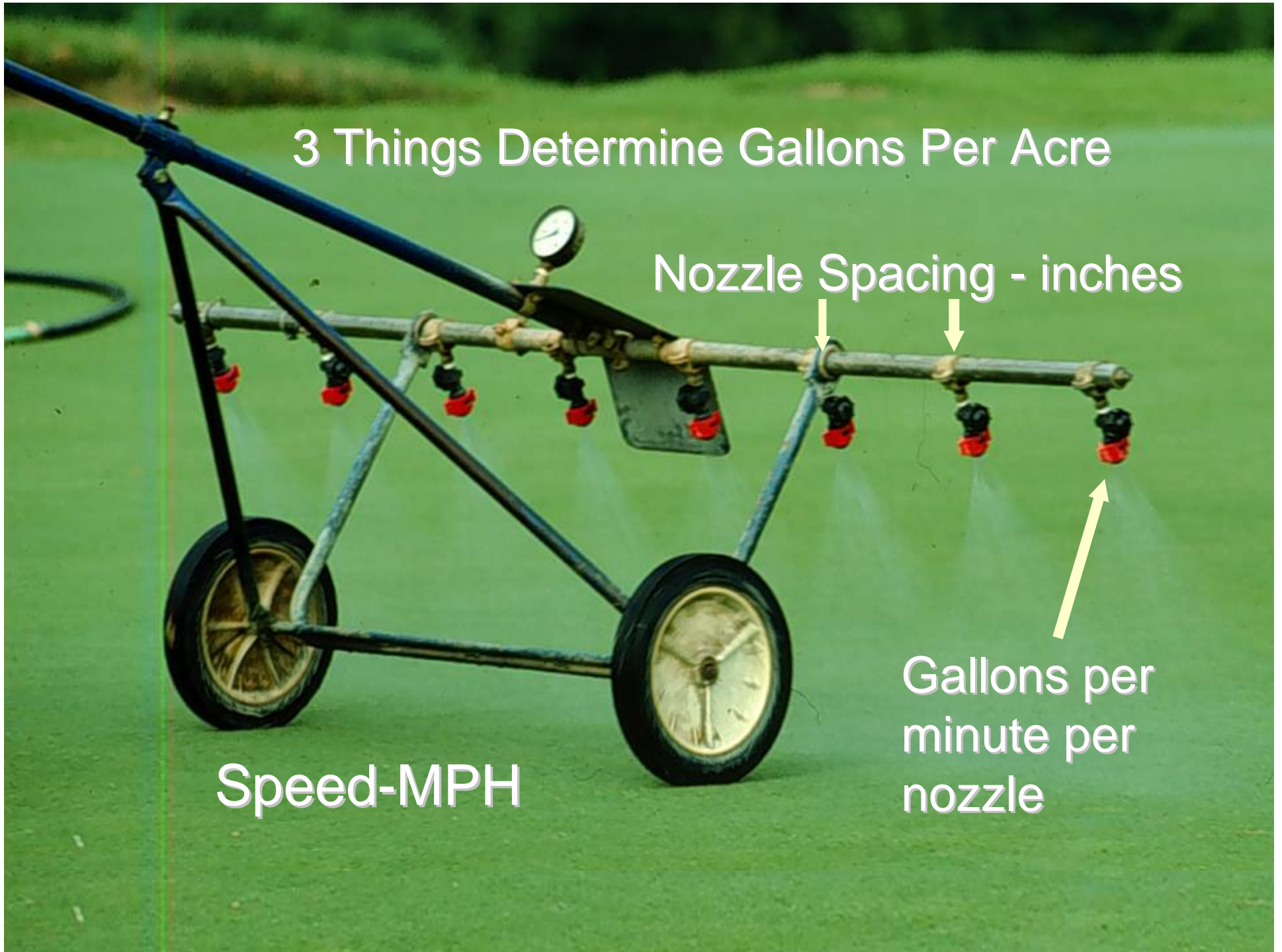


3 Things Determine Gallons Per Acre

Nozzle Spacing - inches

Gallons per
minute per
nozzle

Speed-MPH





Laying out 100 ft distance for speed calibration.



Determining
the time
required to
travel 100 ft

$$\text{Speed in MPH} = \frac{\text{Distance in feet} \times 60}{\text{Time in seconds} \times 88}$$



$$\text{Speed in MPH} = \frac{100 \text{ ft} \times 60 = 6,000}{22.7 \text{ sec} \times 88 = 1997.6} = 3 \text{ MPH}$$

↑
Time required to travel 100 ft



Determining nozzle spacing in inches.

$$\text{Gallons per acre} = \frac{5,940 \times \text{GPM (per nozzle)}}{\text{MPH} \times W}$$

W = nozzle spacing in inches (or sprayed width)

GPM = gallons per minute

GPA = gallons per acre

MPH = miles per hour



Catch output from one nozzle for 1 minute.



Catching a single nozzle on a boom. Catch all nozzles at least one time to determine consistency.



Measuring nozzle output with a graduated cylinder.



128 oz = one gallon

Caught 35 oz in one minute
which equals 0.28 gallons
per minute (GPM)

$$\frac{35 \text{ oz}}{128 \text{ oz}} = 0.28 \text{ gal}$$

Gallons per acre =

$$\frac{5,940 \times 0.28}{4 \times 20}$$

$$4 \times 20$$

W = nozzle spacing in inches (or
sprayed width)

GPM = gallons per minute

GPA = gallons per acre

MPH = miles per hour

Gallons per acre =

$$5,940 \times 0.28 = 1663$$

$$= 20.8 \text{ GPA}$$

$$4 \times 20 = 80$$

Amount to Add to Tank

- Tank capacity = 200 gallons
- Herbicide rate = 1 quart per acre
- Application volume equals 20 gallons per acre

$$\frac{200 \text{ gallon tank}}{20 \text{ gallons per acre}} = 10 \text{ acres per tank}$$

Add 10 quarts per 200 gallon load

Gallons per Minute =

$$\frac{\text{GPA} \times \text{MPH} \times W}{5,940}$$

5,940

W = nozzle spacing in inches (or sprayed width)

GPM = gallons per minute

GPA = gallons per acre

MPH = miles per hour

boomless sprayers

One nozzle or boomless sprayers

5,940 X GPM (per nozzle)

MPH X **W**



For cluster nozzles, Boom Busters or Wiley Tips **W** is sprayed width in inches (Example: 30 ft swath, $W = 360$ inches).

backpack sprayers

1. Put 3 gallons of water in the sprayer
2. Mark off 1,000 square feet
3. Spray that area, measure amount left
4. If 2 gal left then the rate is 1 gal per 1,000 square feet.

Lever operated
backpack



Pump-
up

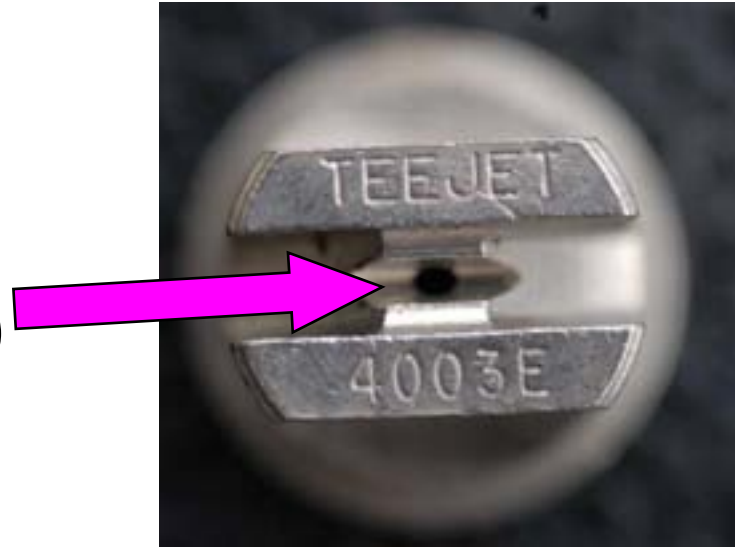
Additional information

Factors Affecting Nozzle Output

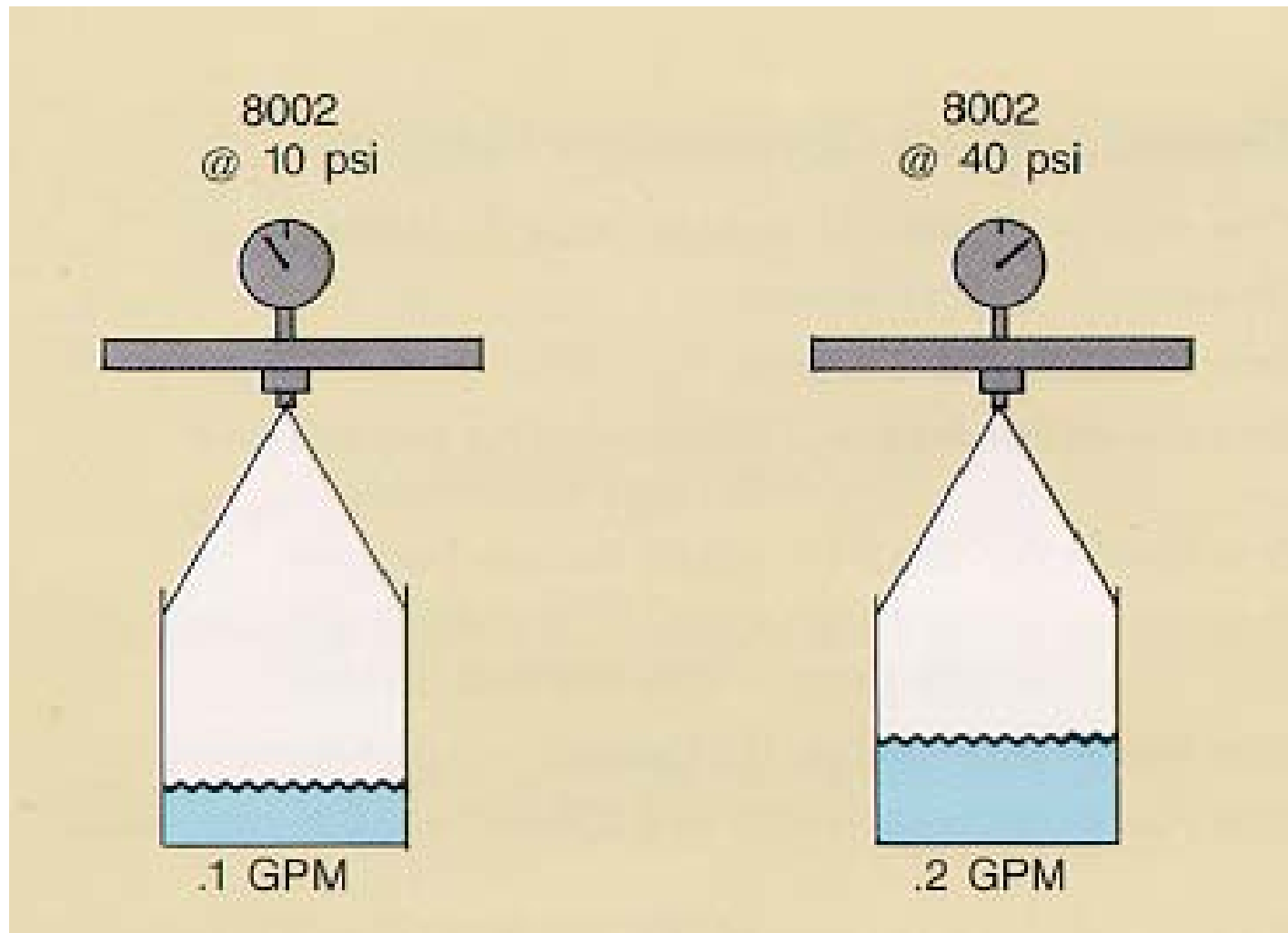
- Pressure



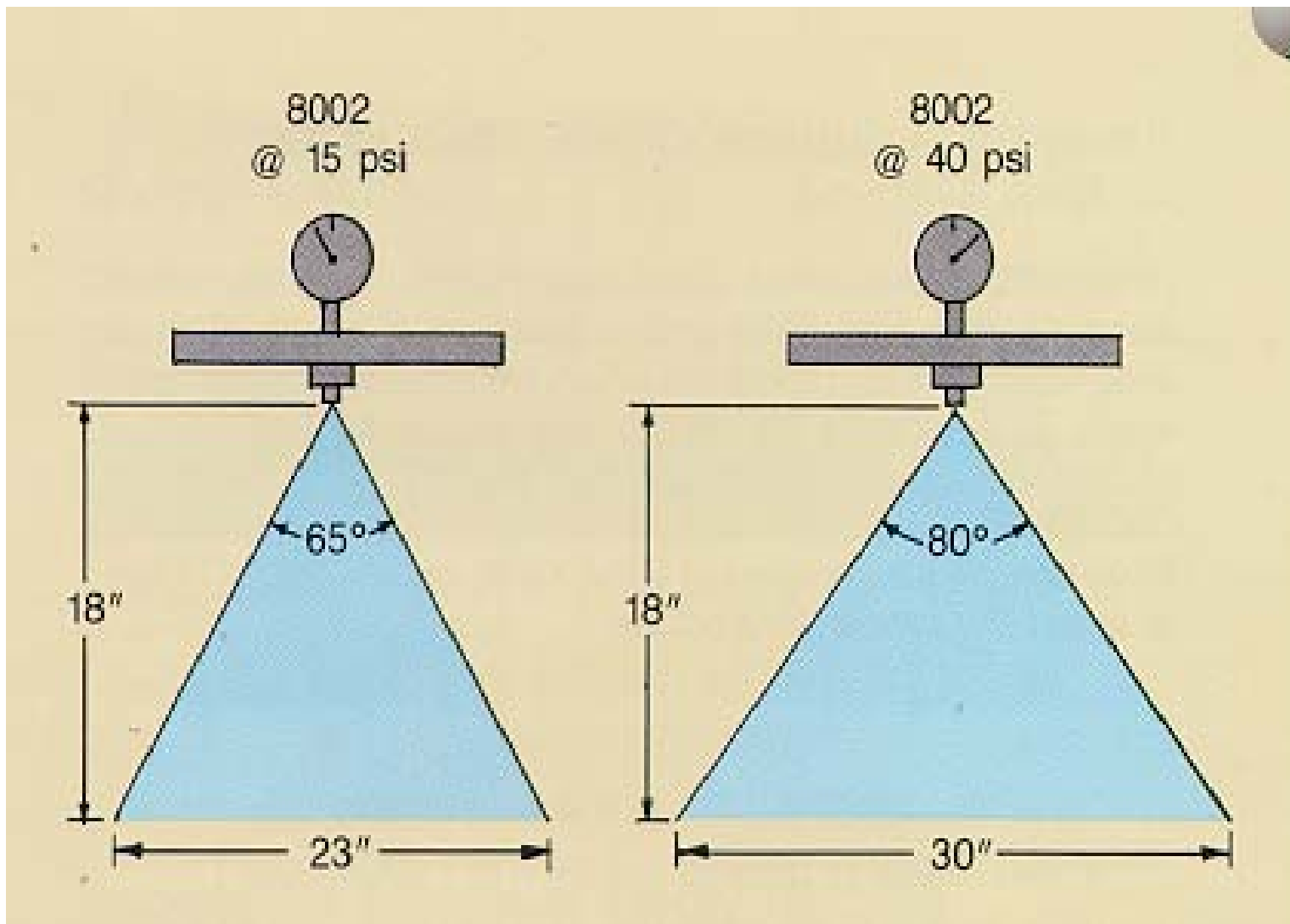
- Size of hole in tip (orifice)



- Viscosity (thickness) of the spray solution



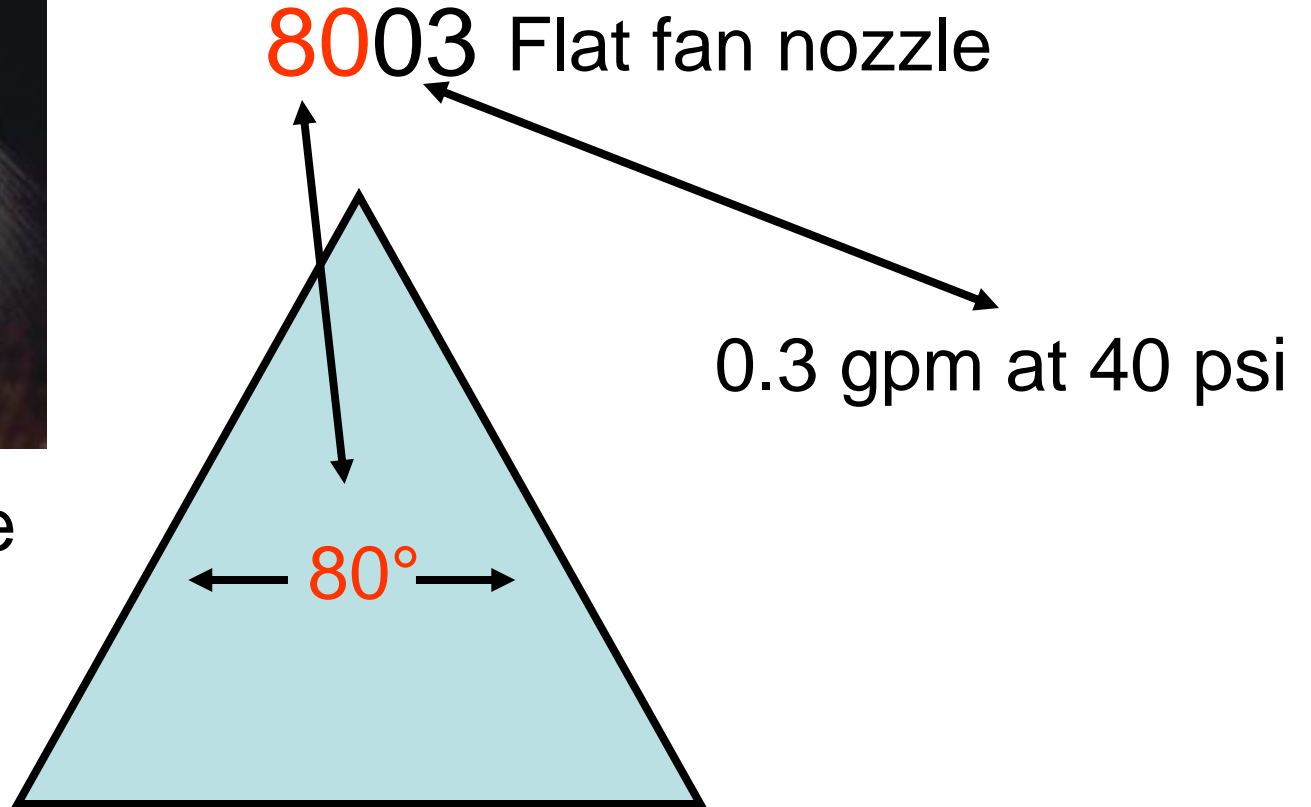
Doubling the boom pressure does not double the gallons per acre. Pressure should be used to make only small adjustments in output



There must be enough pressure to develop the pattern



Flat fan nozzle
pattern



Numbering system for Teejet nozzles



Striping caused by boom being too low or having insufficient pressure to develop spray pattern

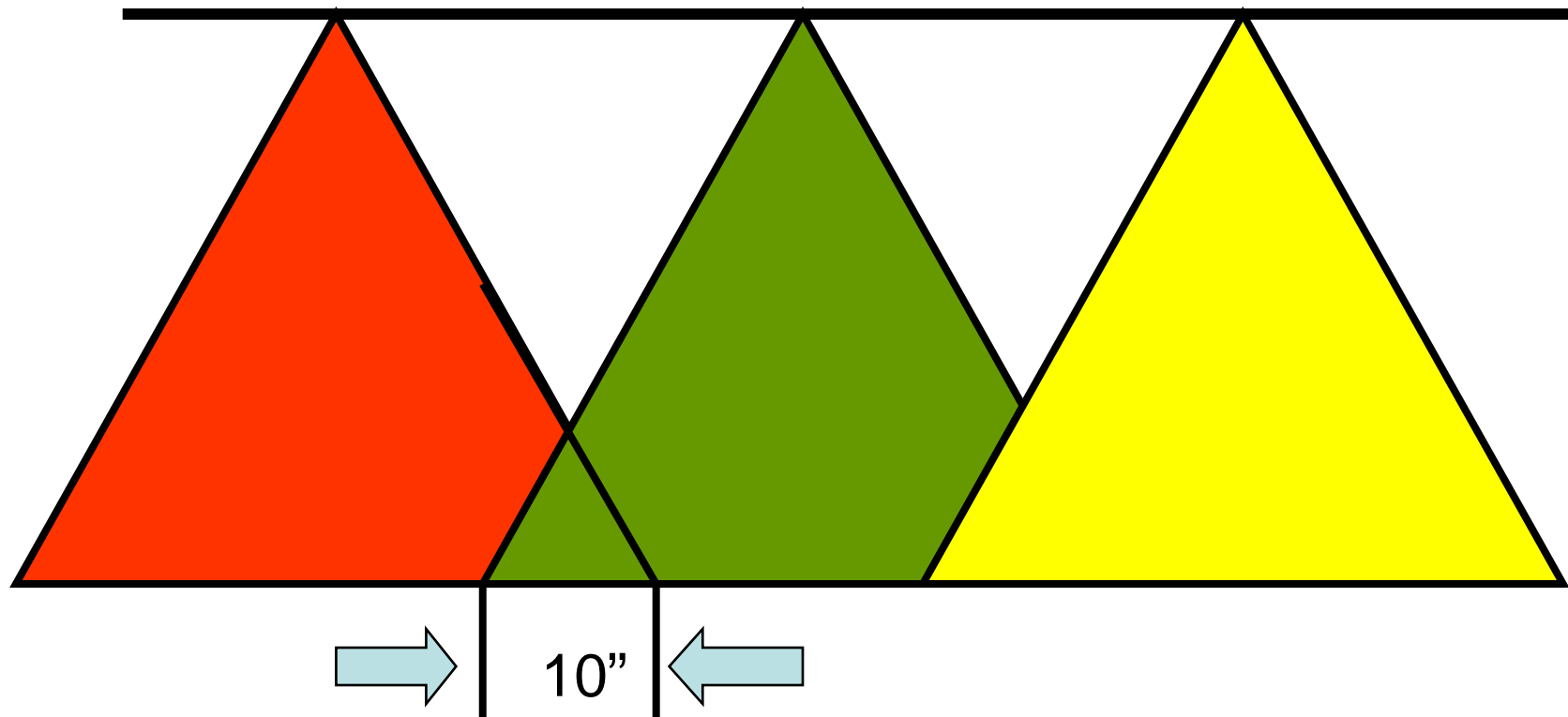


Boom height is the distance from the spray tip to the target



In general, boom height should equal nozzle spacing.

Flat fan nozzles have a tapered output



Proper overlap for flat fan nozzles on a 20 inch spacing



Overlap on tapered flat fan tips

Positioning the boom too high may result in drift.



Use a foam marker to help prevent overlaps and skips.

